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**United States Patent** [19]

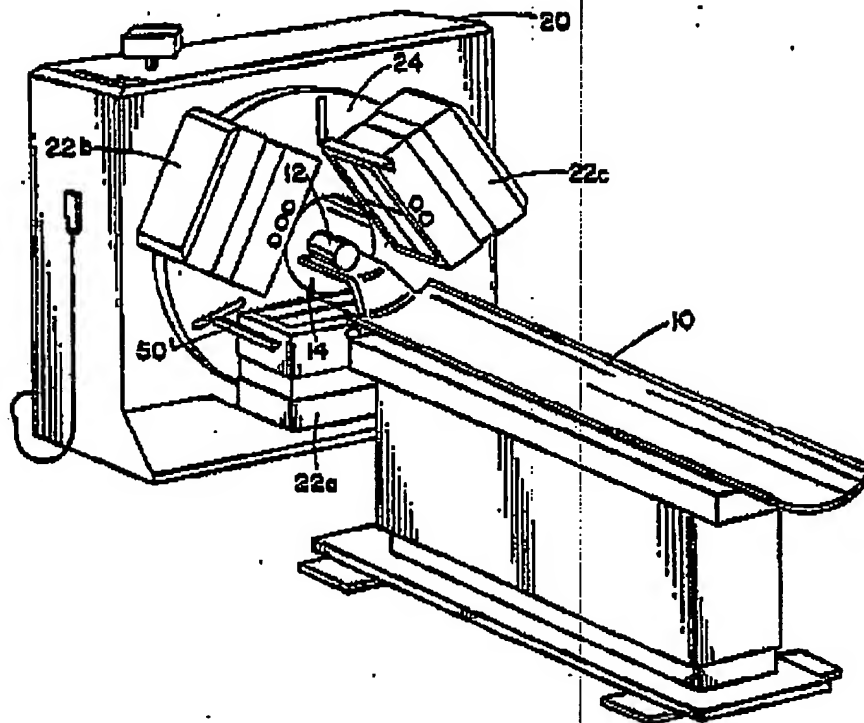
Gullberg et al.

(11) Patent Number: **5,210,421**(45) Date of Patent: **May 11, 1993**

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[54] **SIMULTANEOUS TRANSMISSION AND EMISSION CONVERGING TOMOGRAPHY**[75] Inventors: **Grant T. Gullberg, Salt Lake City, Utah; Hugh T. Morgan, Highland Heights, Ohio; Chi-Hua Tseng, Salt Lake City, Utah; Gengsheng L. Zeng, Salt Lake City, Utah; Paul E. Christian, Salt Lake City, Utah**[73] Assignee: **Pickar International, Inc., Highland Hts., Ohio**[21] Appl. No.: **712,476**[22] Filed: **Jan. 10, 1991**[51] Int. Cl.<sup>3</sup> **G01T 1/166**[52] U.S. Cl. **250/363.04**[53] Field of Search **250/363.04**[56] **References Cited****U.S. PATENT DOCUMENTS**4,670,657 6/1987 **Hawman et al.** 250/305.1  
5,053,687 10/1991 **Ichihara** 250/363.09**FOREIGN PATENT DOCUMENTS**9100048 1/1991 **World Int. Prop. O.** 250/363.04**Primary Examiner—Constance Hannabier**  
**Attorney, Agent, or Firm—Fay, Sharpe, Beall, Fagan, Minnich & McKee**[37] **ABSTRACT**

A SPECT system includes three gamma camera heads (21a), (21b), (21c) which are mounted to a gantry (20) for rotation about a subject (12). The subject is injected with a source of emission radiation, which emission radiation is received by the camera heads. A reconstruction processor (112) reconstructs the emission projection data into a distribution of emission radiation sources in the subject. Transmission radiation from a radiation source (38) passes through the subject and is received by one of the camera heads (21a) concurrently with the emission radiation. The transmission radiation data is reconstructed into a three-dimensional CT type image representation of radiation attenuation characteristics of each pixel of the subject. An attenuation correction processor (118) corrects the emission projection data to compensate for attenuation along the path or ray that it traversed. In this manner, an attenuation corrected distribution of emission sources is generated.

**24 Claims, 7 Drawing Sheets**

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